

# Exhibit K

IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF DELAWARE

HONEYWELL INTERNATIONAL INC., and )  
HONEYWELL INTELLECTUAL PROPERTIES )  
INC., )  
Plaintiffs, ) Civil Action No. 04-1337-KAJ  
(Consolidated)  
v. )  
AUDIOVOX COMMUNICATIONS CORP., )  
AUDIOVOX ELECTRONICS CORPORATION, )  
NIKON CORPORATION, NIKON, INC., NOKIA )  
CORPORATION; NOKIA INC., SANYO )  
ELECTRIC CO., LTD., and SANYO NORTH )  
AMERICA CORPORATION, )  
Defendants. )  
SEIKO EPSON CORPORATION, )  
Intervenor. )  
HONEYWELL INTERNATIONAL INC., and )  
HONEYWELL INTELLECTUAL PROPERTIES )  
INC., )  
Plaintiffs, )  
v. ) Civil Action No. 04-1338-KAJ  
APPLE COMPUTER, INC.; ARGUS A/K/A )  
HARTFORD COMPUTER GROUP, INC.; )  
CASIO COMPUTER CO., LTD.; CASIO, INC.; )  
CONCORD CAMERAS; DELL INC.; EASTMAN )  
KODAK COMPANY; FUJI PHOTO FILM CO., )  
LTD.; FUJI PHOTO FILM U.S.A., INC.; )  
FUJITSU LIMITED; FUJITSU AMERICA, INC.; )  
FUJITSU COMPUTER PRODUCTS OF )  
AMERICA, INC.; KYOCERA WIRELESS )  
CORP.; MATSUSHITA ELECTRICAL )  
INDUSTRIAL CO.; MATSUSHITA )  
ELECTRICAL CORPORATION OF AMERICA; )  
NAVMAN NZ LIMITED; NAVMAN U.S.A. INC.; )  
OLYMPUS CORPORATION; OLYMPUS )

AMERICA, INC.; PENTAX CORPORATION; )  
PENTAX U.S.A., INC.; SONY CORPORATION; )  
SONY CORPORATION OF AMERICA; SONY )  
ERICSSON MOBILE COMMUNICATIONS AB; )  
SONY ERICSSON MOBILE )  
COMMUNICATIONS (USA) INC.; TOSHIBA )  
CORPORATION; and TOSHIBA AMERICA, )  
INC., )  
Defendants. )  
SEIKO EPSON CORPORATION, )  
Intervenor. )  
OPTREX AMERICA, INC., )  
Plaintiff, )  
v. ) Civil Action No. 04-1536-KAJ  
HONEYWELL INTERNATIONAL INC., and )  
HONEYWELL INTELLECTUAL PROPERTIES )  
INC., )  
Defendants. )

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**MEMORANDUM ORDER**

In these consolidated cases, Honeywell International, Inc. and Honeywell Intellectual Properties, Inc. (collectively "Honeywell") have sued 35 defendants, C.A. Nos. 04-1338-KAJ and 04-1337-KAJ, and have been sued in turn, C.A. No. 04-1536-KAJ. Several third-party defendants have also been brought into the fray. In all of the cases, the underlying issue is whether Liquid Crystal Display ("LCD") modules incorporated into consumer electronics products infringe Honeywell's U.S. Patent No. 5,280,371 (the "371 patent" or "patent-in-suit"). The extraordinary number of

defendants includes many who are retailers of products that incorporate LCD modules, or are consumer device manufacturers that only acquire LCD modules from other manufacturers, rather than being manufacturers of the modules themselves.<sup>1</sup> Given that number and variety of defendants, I have attempted for several months to bring the parties to a consensus position on how best to organize the cases so that the litigation can proceed on an efficient and appropriate basis, with suit proceeding against the Manufacturers in the first instance. (See D.I. 119 in C.A. 04-1337-KAJ.)

Among other things, on May 18, 2005, I issued a Memorandum Order stating that "large-scale litigation like this requires the business and strategic legal interests of the plaintiff to cede some ground to case management imperatives." (*Id.* at 7.) I ruled that dealing first with the Manufacturers "is the fairest and most efficient way to proceed." (*Id.* at 8.) To that end, I stayed the cases against the Non-manufacturer Defendants, with the exception of permitting Honeywell to take some limited discovery to determine the identity of Manufacturers whom it may wish to sue as infringers. I ordered the parties "to confer and provide me with proposed language respecting permissible discovery activities directed at the non-manufacturer defendants during the stay." Unfortunately, despite two in-person conferences with counsel, which involved literally dozens of attorneys, and despite the direction given in the Memorandum Order

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<sup>1</sup>For ease of reference, I will refer herein to the manufacturers of LCD modules as the "Manufacturers," and to the retailers and the consumer device manufacturers as the "Non-manufacturer Defendants". These definitions do not pertain to third-party defendants. For case organization and scheduling purposes, those defendants who are both consumer device manufacturers and manufacturers of LCD modules shall be treated as Non-manufacturer Defendants only to the extent that they do not manufacture LCD modules in certain of their products; otherwise they shall be treated as Manufacturers, unless otherwise ordered.

in May, these cases are still not progressing. It is apparent that I have not been sufficiently clear in previous statements to guide the parties toward a mutually acceptable resolution of the allowable discovery against the Non-manufacturer Defendants. I now have a request from Honeywell seeking yet another in-person conference of the parties and the court. (D.I. 139.) Because I do not believe further discussion will be productive and will only increase the substantial costs associated with these cases, I will not again convene the platoons of attorneys involved. Instead, I am providing the following direction<sup>2</sup> and schedule for discovery against the Non-manufacturer Defendants.

IT IS HEREBY ORDERED that:

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<sup>2</sup>The directions given here are consistent with what I have previously told the parties. During the last conference with the counsel, I stated:

I said in the order that I put out last May that Honeywell was required to specifically identify accused products. And that's what I meant. Not that Honeywell was entitled to say, you know, we think all your cellular phones infringe so we want you to tell us everything about all your cellular phones. What I mean is if you've got a basis for believing that a manufacturer's cellular phones are infringing, and I mean you can say we've done this tear-down on these specific products and these things appear to us to infringe, well, then you are absolutely entitled to conduct additional discovery with respect to those products, that is, were earlier generations than the one you tore down. Also, have they come out with subsequent generations of that same model which could also be infringing?

But what you are not entitled to do is to say you manufacture 15 different kinds of cell phones. We tore down three. Tell us about your other 12. Because I agree with the defendants that now what you are doing is you are telling manufacturers, you know what? You got one or two things that are bad. We want to you do an analysis of everything you make and tell us whether you are guilty on those fronts, too; and that is not what the law requires, and it's not what I'm going to require them to do.

If you want to go out, you want to buy them, you want to do the tear-downs, you want to get information that prompts you to be able to say "now I know that this specific model also infringes," then you can certainly do that. And then you would be in an area where you could be requiring additional discovery from them. But to ask them to come forward in the first instance, which is what it really comes down to, is not right. (Transcript of September 9, 2005 Conference, at pp. 27-29.)

1. Within 21 days, each Non-manufacturer Defendant shall provide to Honeywell the identity of the Manufacturers of LCDs incorporated into that Defendant's products and product lines which have been identified by Honeywell with specificity (e.g., by make and model number). To the extent Honeywell identifies the products in which the so-called "unknown" modules are incorporated, as referred to in Honeywell's May 27, 2005 letter proposal to defense counsel (see D.I. 135 at p. 3, ¶ 2; D.I. 138 at p. 1, ¶ 1), the Non-manufacturer Defendants shall also identify the Manufacturers of those modules. The information to be provided to Honeywell shall include the following: (a) an identification of the supplier and LCD module number for the products Honeywell has specifically identified as infringing the patent-in-suit; (b) an identification of other versions (i.e., earlier or later generations) of the specifically identified products that utilize the same LCD module as in the specifically identified products, or other versions of the same LCD module, if any; and (c) an identification of other versions of the identified products that include other LCD modules with substantially the same structure as the LCD module or modules contained in the specifically identified products, if any. To the extent a Non-manufacturer Defendant and Honeywell have already reached a mutually agreeable basis for the exchange of information about Manufacturers, this paragraph 1 shall not apply to that Non-manufacturer Defendant.

2. Within 30 days, Honeywell shall file an amended complaint, or a new complaint to be added to these consolidated cases, in which, consistent with the obligations imposed by the Federal Rules of Civil Procedure, Honeywell names as defendants any Manufacturers it wishes to accuse of infringing the patent-in-suit.

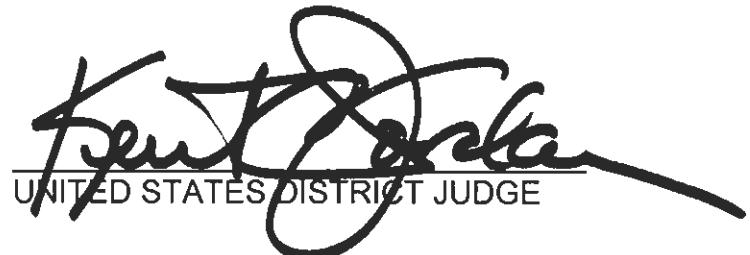
3. Except for the Non-manufacturer Defendants that have resolved their disagreements with Honeywell concerning information exchange, within 7 days after receipt of a service copy of an amended or new complaint as referenced above, each Non-manufacturer Defendant shall forward a copy of such amended or new complaint to the newly sued Manufacturers who supply LCD modules to that defendant. At the same time, such Non-manufacturer Defendants shall forward the contact information for Honeywell's attorneys of record in these consolidated cases and provide to the Manufacturers copies of this Memorandum Order and the May 18, 2005 Memorandum Order, emphasizing the public interest in having Honeywell's infringement claims tested first in litigation against the LCD module Manufacturers. The Non-manufacturer Defendants shall use reasonable, good-faith efforts to persuade the Manufacturers that supply them with allegedly infringing LCD modules to waive formal service of process and to accept service of the amended or new complaint directly from Honeywell's attorneys of record. Any Manufacturer that waives formal service and accepts such service shall have 90 days to answer, move, or otherwise plead, as provided in Federal Rule of Civil Procedure 12(a)(1)(B).

4. Upon compliance with sections 1 through 3 above, the suits against the Non-manufacturer Defendants shall be entirely stayed. The stay shall be without prejudice to Honeywell's seeking an order for further discovery from the Non-manufacturer Defendants, subject to any agreement Honeywell may have with any such defendant concerning discovery.

5. Upon appearance of all Manufacturers named in the amended or new complaints, or such earlier time as agreed upon by Honeywell, Optrex America, Inc.,

and Seiko Epson Corporation, those Manufacturers who have appeared as defendants in the consolidated cases, shall promptly meet with Honeywell, Optrex America, Inc., and Seiko Epson Corporation to discuss a schedule for remaining pretrial activities and shall report to the court with a joint proposed scheduling order to govern the remaining pretrial activities with respect to those parties.

6. In any event, a report on progress toward establishing a schedule for bringing to trial claims against Manufacturers shall be submitted no later than January 9, 2006.



UNITED STATES DISTRICT JUDGE

October 7, 2005  
Wilmington, Delaware

# Exhibit L

## 1 THE UNITED STATES DISTRICT COURT

2 IN AND FOR THE DISTRICT OF DELAWARE

3

4 HONEYWELL INTERNATIONAL, INC. : CIVIL ACTIONS  
et al. :  
56 Plaintiffs, :  
78 v. :  
910 AUDIOVOX COMMUNICATIONS CORP., :  
et al. :  
11 Defendants. : NO. 04-1337 (KAJ)12 HONEYWELL INTERNATIONAL, INC. :  
et al. :  
1314 Plaintiffs, :  
1516 v. :  
1718 APPLE COMPUTER, INC., et al., :  
19 Defendants. : NO. 04-1338 (KAJ)20 OPTREX AMERICA, INC., :  
2122 Plaintiff, :  
2324 v. :  
2526 HONEYWELL INTERNATIONAL, INC. :  
et al. :  
27

28 Defendants. : NO. 04-1536 (KAJ)

- - -

29 Wilmington, Delaware

30 Friday, July 21, 2006 at 11:03 a.m.

31 TELEPHONE CONFERENCE

- - -

32 BEFORE: HONORABLE **KENT A. JORDAN**, U.S.D.C.J.

- - -

33

34

35

1 opportunity to explain to me why you think the way you  
2 framed your demand for additional discovery from these folks  
3 is correct in light of what we've had to say to each other  
4 over the course of a few meetings and many, many months.

5 MR. WOODS: Your Honor, thank you. And we would  
6 respectfully submit that if you look at that whole exchange,  
7 as Mr. Horwitz was suggesting, there was clearly a sense,  
8 as we believe we're entitled to under the law, to get some  
9 discovery about modules other than those that have been  
10 expressly located and expressly torn down and expressly  
11 identified.

12 THE COURT: And now, when you say you are  
13 entitled to under the law.

14 MR. WOODS: Correct.

15 THE COURT: Well, you know what?

16 MR. WOODS: Your Honor?

17 THE COURT: I guess I'm trying to pull from you  
18 where you think this is linked to my instructions to you  
19 folks that you had an obligation to tell people, look, this  
20 is your product. We think it infringes. Here is why. You  
21 know, we're accusing you of infringing. We've got something  
22 that we believe infringes. That ought to be the baseline.  
23 Everybody should have understood that from what I've said to  
24 people repeatedly.

25 MR. WOODS: Correct.

1 THE COURT: Now, they are saying you have  
2 unmoored your discovery from that foundation, and you have  
3 heard Mr. Horwitz explain why they believe that. I'm trying  
4 to get you to explain to me how it is you are rooted in that  
5 foundation, because that is the foundational principle from  
6 which I am operating.

7 MR. WOODS: Yes, Your Honor. The request we  
8 have made absolutely is rooted in the foundation. We  
9 identified a series of modules that have been torn down and  
10 are accused of infringement. As we have told defendants,  
11 those modules have the following criteria. They are back  
12 lit. They have an LCD panel and they have two particular  
13 arrays, at least one of which misaligned, and that is the  
14 commonality amongst everything that has been identified and  
15 torn down. And that is how we, Honeywell, understood the  
16 term "substantially the same" to be implemented in the  
17 Court's order.

18 So we have said to defendants we are asking you  
19 to identify those modules which are substantially the same  
20 as those which were expressly identified by model number  
21 and the way we are defining "substantially the same" is as  
22 Mr. Lueck and you discussed at the September 9th hearing on  
23 page 31 where we are trying to provide objective criteria  
24 for doing that analysis.

25 And so we have in fact moored our request for

1 discovery not for some fishing expedition, not for  
2 everything under the sun but rather take those modules that  
3 have been expressly identified and look at these features.  
4 And we are asking for everything that has those same  
5 features.

6 THE COURT: Okay. I have your position and I  
7 can only apologize to the parties because to the extent I've  
8 been unclear before, it's not been intentional. I just  
9 can't agree with Honeywell here because I'm bound, I think,  
10 to agree that what you have done is to say, under the  
11 rubric of "substantially the same," is to just recast as a  
12 discovery request, tell me everything that infringes my  
13 claim. And that is precisely that I have been trying to  
14 avoid in this matter, because I view that as a reversal, a  
15 basic reversal of the obligation of parties in litigation.

16 You know, maybe I'll turn out to be wrong about  
17 this but I don't think you can go to somebody and say I'm  
18 suing you and now tell me why I'm suing you, which is what  
19 in effect this discovery demands. And I had attempted  
20 previously to say, as clearly as I knew how but evidently  
21 not clearly enough, you identify what the problem is and  
22 they'll have to respond to that. And then Mr. Lueck, as a  
23 skillful advocate, would have said, well, there may be  
24 versions of this very same device which we can't say by  
25 model number because if we're one letter off -- now, I'm

1 interpolating, not precisely quoting what he had to say. If  
2 we're one letter off or one number off in the alphanumeric  
3 sequence in the model number, they could say, well, you  
4 didn't ask about that and that's not fair, and I was  
5 agreeing well that isn't fair. You know, if you've got a  
6 next generation of the very thing you've produced, the fact  
7 that you can't name it with precision using the alphanumeric  
8 sequence attached to that make or model number shouldn't  
9 prevent you from getting discovery on that.

10                   That was not intended to open the door for  
11 you to say, now, and anything else that meets the claim  
12 language, tell us about that, too. I don't view that as  
13 proper discovery. I mean that turns the process on its head  
14 and I'm just not having it.

15                   So to the extent I left people thinking that was  
16 the problem or the way I wanted you to proceed, I apologize  
17 because it isn't. And I reject the assertion that this  
18 raises res judicata problems for you or claim splitting. If  
19 you sue them on a specific thing and in the course of  
20 discovery, they don't tell you about a different product,  
21 nobody I think in their right mind is going to say, well,  
22 you gave up a claim against that accused product because  
23 you never had the chance to accuse it. So I view that as  
24 a red herring.

25                   So I'm hoping this is clear enough in telling

1 people, Honeywell, if you want to sue people, fine, sue  
2 them. But have in mind exactly what it is you're accusing  
3 them of doing. And that means if you say they've produced  
4 an accused device, you need to have some basis for saying  
5 they have an accused device and ask them, okay, tell us  
6 about this accused device. You can't say to them, look  
7 across your product line and tell us everything that meets  
8 our claim language.

9 So have I been clear enough? You could  
10 disagree with me, obviously, that this is a correct or an  
11 appropriate approach but at least you understand what I'm  
12 getting at now, Mr. Lueck and Mr. Woods?

13 MR. WOODS: Your Honor, we certainly understand.  
14 And I, with Your Honor's indulgence, just have to ask if I  
15 could just say one thing, please, because we do respectfully  
16 disagree with the Court about the concern about the  
17 potential for res judicata here. We do recognize that there  
18 is law out there like the Sharp case that has been cited  
19 that talk about the standard for getting additional module  
20 model numbers in an industry where models change.

21 We have proposed to the defendants we're  
22 willing to buy their modules. We're willing to buy it.  
23 Historically, you can't get these things any more and yet  
24 they're still within the statute of limitations period. For  
25 all these reasons, because respectfully we believe what Your

1 Honor is doing is having a tremendously prejudicial effect  
2 upon Honeywell's claim, we would respectfully be allowed to  
3 brief this issue. We understand where the Court is going.  
4 Nevertheless, we feel obligated to create a record here.

5 THE COURT: You've got a record. You have a  
6 record which is adequate for review. I don't think any  
7 reviewing court is going to look at this and say you didn't  
8 make your position clear. I don't need any more paper on  
9 this. You don't need to persuade me that you have a  
10 position and you think the position is well founded. My job  
11 is not to say to you, to every party that has got a position  
12 well, okay, go ahead and give me another 40 pages of paper  
13 about it. We have been over this now. This is at least the  
14 third time I have taken a crack at this. And I've done it  
15 in print and I've done it orally and I just don't need more  
16 paper on it.

17 It could be I'm wrong. I certainly get  
18 reversed; to my chagrin, I do; but I don't think you've got  
19 the better of it. I think I understand the argument that  
20 you've made and what I'm telling you is you don't have the  
21 better of the argument in my view. So let's move forward  
22 with the case you've got.

23 MR. WOODS: Yes, Your Honor. One final point of  
24 clarification.

25 You had asked if we understood. Is it Your

# Exhibit M

**REDACTED  
DOCUMENT**

# Exhibit N

**REDACTED  
DOCUMENT**

# Exhibit O

**REDACTED  
DOCUMENT**

# Exhibit P

**MORRIS, NICHOLS, ARSHT & TUNNELL LLP**

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April 23, 2008

**BY E-MAIL**

Special Master Vincent J. Poppiti  
Blank Rome, LLP  
1201 N. Market Street, Suite 800  
Wilmington, DE 19801

Re: *Honeywell International Inc., et al. v. Apple Computer, Inc., et al.*  
C.A. No. 04-1338-JJF

Dear Judge Poppiti:

In preparation for this Thursday's hearing, Honeywell respectfully submits the following letter to provide Your Honor with some basic background about the case and to outline the issues which will need to be addressed in order to fairly and efficiently determine the status of the "Customer" defendants.

**NATURE OF CASE & PROCEDURAL HISTORY**

This is an action for patent infringement. Honeywell asserts that the majority of the consumer electronics industry has infringed its patent, U.S. Patent No. 5,280,371 ("the '371 patent," a copy of which is appended hereto as Exhibit A). The '371 patent covers an improved liquid crystal display ("LCD") module – one which generates a brighter image without using additional battery power and without the appearance of a troublesome optical phenomenon known as the moiré effect.

Members of the consumer electronics industry generally fall into two classes of entities: those who manufacture the LCD modules (the "Manufacturer Defendants"); and those who incorporate such modules into completed end products such as a notebook computer, a cell phone, PDA/Blackberries and digital video cameras/camcorders (the "Customer Defendants"). Some defendants engage in both activities, and were labeled colloquially as "hybrids."

Honeywell initiated this suit in October 2004 against 37 Customer Defendants, a comprehensive list of which is attached as Exhibit B. Note that these defendants can fairly be

Special Master Vincent J. Poppiti  
 April 23, 2008  
 Page 2

grouped into approximately 20 groups, due to affiliated relationships. Although the initial set of defendants included some entities which were "hybrids," the focus of Honeywell's original suit was upon the sale of end products. Honeywell made this decision out of a desire to avoid jurisdictional issues and because it is the Customer Defendants who reap the greatest benefit from the '371 invention.

However, the Customer Defendants moved to stay Honeywell's original Complaint against them until Honeywell first resolved its claims against the Manufacturer Defendants. The Customer Defendants argued that they had no information about the internal workings/componentry of the LCD modules used in their products. Judge Jordan accepted this argument and ordered Honeywell to reconfigure the case by filing an Amended Complaint against the Manufacturer Defendants (a list of the Manufacturer Defendants is appended hereto as Exhibit C). As a precondition for the Stay, however, Judge Jordan ordered the Customer Defendants to first identify the particular Manufacturer Defendants who supply modules to them for the accused products. This identification process took place over the summer and fall of 2005, and was done informally. Honeywell never had any opportunity to conduct discovery regarding this threshold issue, nor in any way verify the substance or methodology by which these disclosures were made.

Based in part upon these disclosures, and in part upon its ongoing investigation, Honeywell filed the Amended Complaint against the Manufacturer Defendants in November 2005. After this point in time, the Customer Defendants – by their own choice – did not participate in any way in the discovery of the case.<sup>1</sup>

#### **HONEYWELL'S LICENSING PROGRAM**

Consistent with its litigation efforts, and crucial to the Special Master's charge as discussed below, Honeywell has undertaken a program to license the '371 patent. Honeywell had already entered into several licenses prior to the lawsuit against the Manufacturer Defendants, and continued entering into such agreements as the case evolved through discovery. As it currently stands, Honeywell has agreements with 20 entities, as listed in Exhibit E appended to this letter. This leaves only four Manufacturer Defendants remaining in the case: Optrex; Samsung SDI; Fuji; and Citizen (although Judge Farnan recently denied a fifth Manufacturer Defendant, InnoLux's Motion to Dismiss).

The exact terms and conditions of these licenses are confidential. The agreements have been produced to the Manufacturer Defendants pursuant to Protective Order in this case, which limits their disclosure to outside counsels' eyes only. Obviously, the specific terms of those agreements have a direct impact on whether any particular Customer Defendant is entitled to be dismissed from this suit.

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<sup>1</sup> A general overview of the chronology of the case is appended to this letter as Exhibit D.

Special Master Vincent J. Poppiti  
April 23, 2008  
Page 3

### **ISSUES FOR CONSIDERATION**

The fundamental charge to the Special Master is to make findings and recommendations as to whether any stayed Customer Defendant is entitled to be dismissed from the case, and if so, under what terms. Honeywell's basic position on this issue has been consistent as its licensing program has evolved: it is willing to stipulate to the dismissal of any Customer Defendant who can provide a representation that it is only using licensed LCD modules. Unfortunately, no defendant has been willing to make this representation to date. As a result, in order to efficiently present this issue to Your Honor, the parties need to exchange a variety of information. Indeed, at the April 2 hearing, Judge Farnan explicitly stated that Honeywell was entitled to get information necessary to confirm whether any Customer Defendant is entitled to be dismissed from the case.

### **PROCEDURES, SCOPE AND TIMING OF DISCOVERY**

Honeywell submits that the Special Master should direct the parties to engage in a meet and confer process analogous to what is required under Rule 26 of the Federal Rules of Civil Procedure, whereby they will attempt to agree upon the procedures, scope and timing of discovery. At this initial stage, Honeywell can identify certain categories that are likely to be at issue:

1. The parties and the Special Master need to agree upon a confidentiality/protective order to govern the discovery in this case. Given that the current Order governing this case entered by Judge Jordan has served Honeywell and the Manufacturer Defendants well, Honeywell respectfully submits that this Order be extended to cover these proceedings and the parties participating in them.

2. Defendants have yet to provide a list exhaustively identifying the particular Customer Defendants that are joining in these proceedings. Because arguments may be uniquely tailored to each particular defendant, Honeywell respectfully submits that any Customer Defendant wishing to join in these proceedings identify itself immediately.

3. Production of the pertinent license agreements, pursuant to the Protective Order; thereafter, the Customer Defendants may want to take discovery regarding the generation/interpretation of those agreements.

4. Determination of whether any participating Customer Defendant purchases LCD modules from the remaining Manufacturer Defendants Optrex, Samsung SDI and/or InnoLux.<sup>2</sup>

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<sup>2</sup> As noted above, there are five remaining Manufacturer Defendants. However, for reasons contained within the confidential record, Honeywell would not seek information regarding supply of modules from Fuji and Citizen.

Special Master Vincent J. Poppiti  
April 23, 2008  
Page 4

5. Agreeing upon a process for verifying/authenticating the substance and methodology used by the Customer Defendants to generate the 2005 disclosures that were made prior to entry of the Stay.

6. Sharing with the Customer Defendants additional information obtained by Honeywell regarding accused products which has been generated *after* the entry of the Stay, including sharing a comprehensive list of modules made by the remaining Manufacturer Defendants and sharing information regarding additional end products identified by Honeywell's ongoing investigation efforts for which the LCD maker could not be identified. The Customer Defendants should provide discovery regarding these additional accused products.

\* \* \*

Honeywell suggests that all participating parties be required to meet and confer with regard to the scope and content of discovery within two weeks of Thursday's hearing, and report back to the Special Master as to those areas of the agreement and any remaining issues with the Special Master will need to resolve.

Depending upon the amount and type of discovery agreed to by the parties, the parties will also propose a schedule for completing discovery. This schedule should include some type of periodic update to the Special Master. It should also include a timeline for any participating Customer Defendant to submit proposed findings and recommendations for the Special Master's consideration, and for Honeywell to submit a responsive set of proposed findings and recommendations.

Honeywell thanks Your Honor for your prompt and willing consideration of the matter, and looks forward to addressing this matter on Thursday.

Respectfully,



Thomas C. Grimm

TCG  
Enclosures  
cc: All Counsel of Record (by e-mail, w/encls.)  
(see attached lists)

## **EXHIBIT A**

US005280371A

**United States Patent [19]****McCartney, Jr. et al.****[11] Patent Number: 5,280,371****[45] Date of Patent: Jan. 18, 1994****[54] DIRECTIONAL DIFFUSER FOR A LIQUID CRYSTAL DISPLAY**

[75] Inventors: **Richard I. McCartney, Jr.,**  
 Scottsdale; **Daniel D. Syroid,**  
 Glendale; **Karen E. Jachimowicz,**  
 Goodyear, all of Ariz.

[73] Assignee: **Honeywell Inc.,** Minneapolis, Minn.

[21] Appl. No.: **911,547**

[22] Filed: **Jul. 9, 1992**

[51] Int. Cl.<sup>5</sup> ..... **G02F 1/133**  
 [52] U.S. Cl. ..... **359/40; 359/69**  
 [58] Field of Search ..... **359/69, 40, 41**

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**OTHER PUBLICATIONS**

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*Primary Examiner*—William L. Sikes

*Assistant Examiner*—Huy Mai

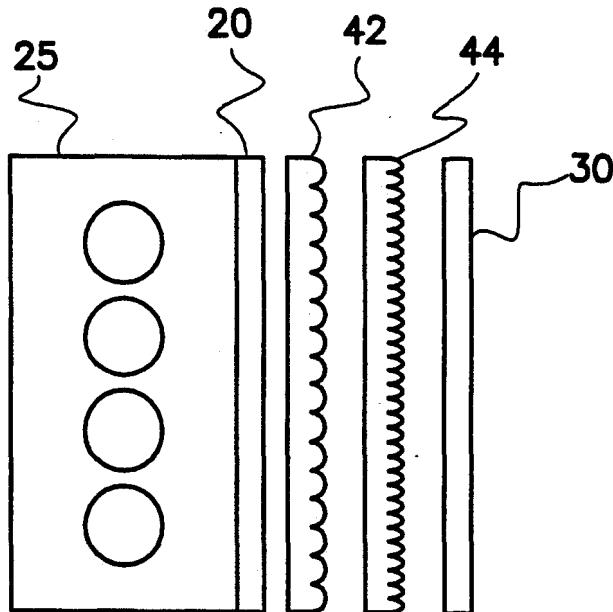
*Attorney, Agent, or Firm*—Dale E. Jepsen; A. Medved

[57]

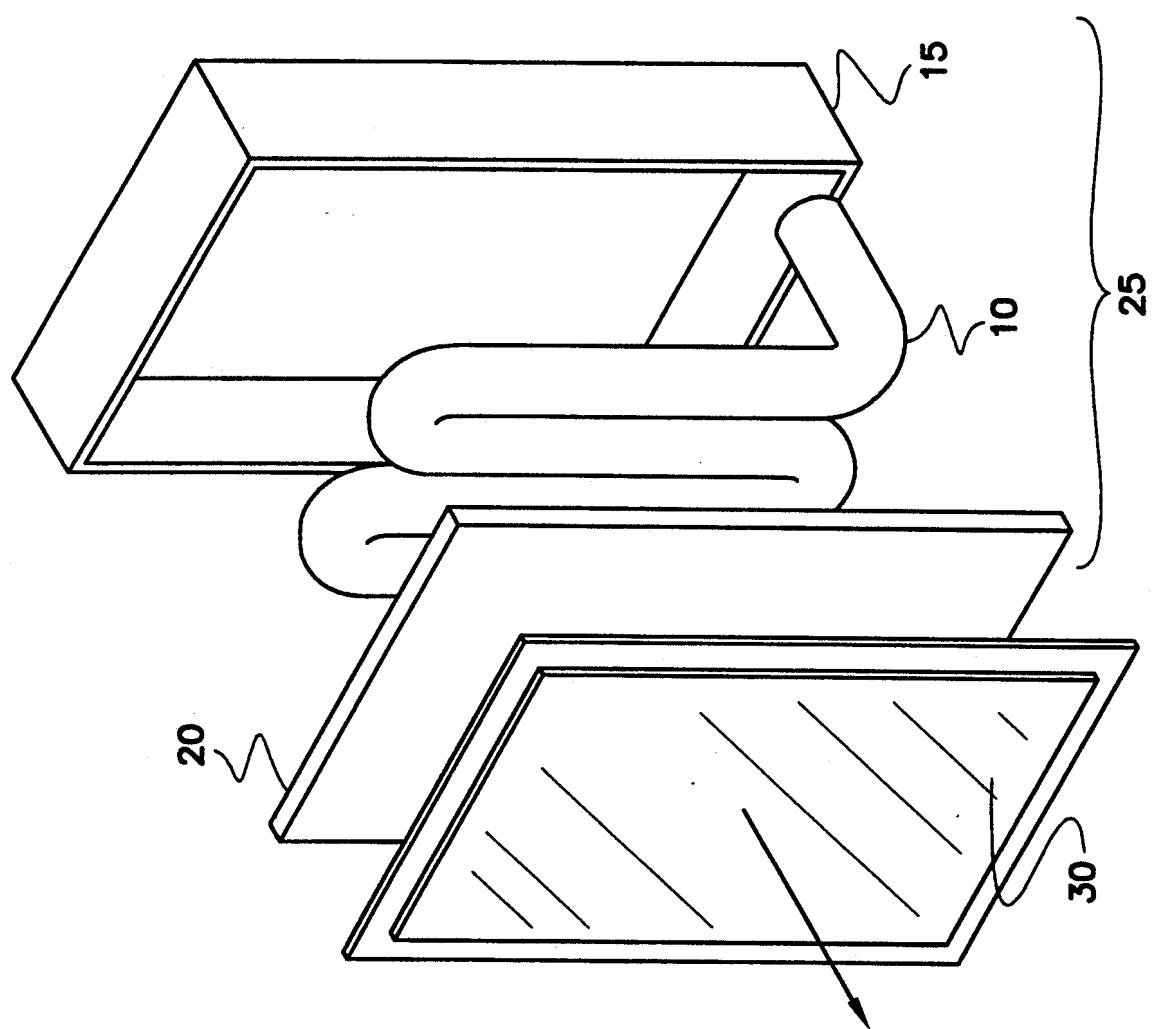
**ABSTRACT**

A display apparatus including a light source, a liquid crystal panel, and one or more directional diffuser lens arrays disposed therebetween provides a tailored variation of luminance with viewing angle, a uniform variation of luminance with viewing angle within a first predetermined range of viewing angles and a concentration of light energy within a second predetermined range of viewing angles.

**3 Claims, 11 Drawing Sheets**



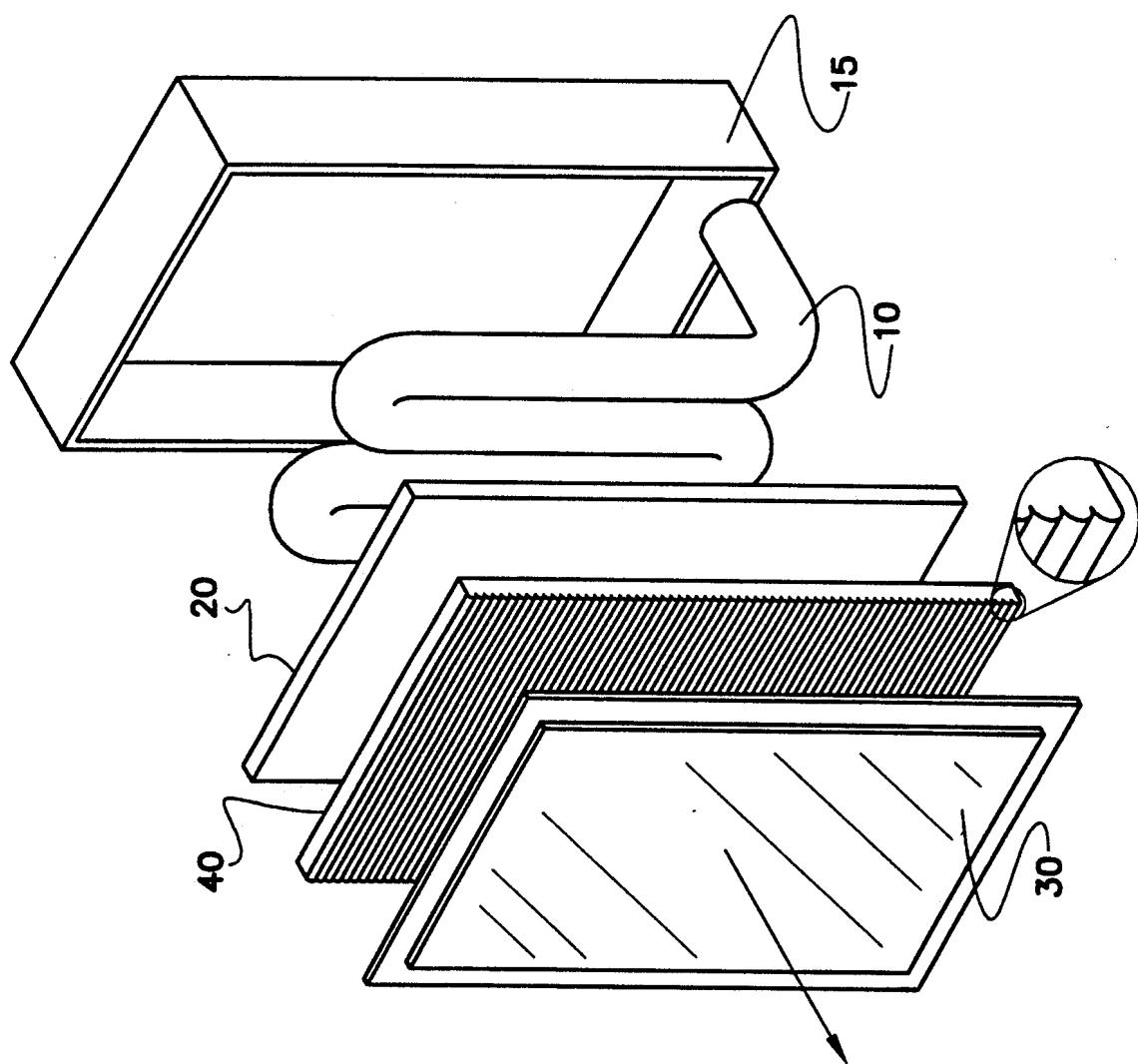
*Fig. 1*  
PRIOR ART



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**5,280,371***Fig. 2*

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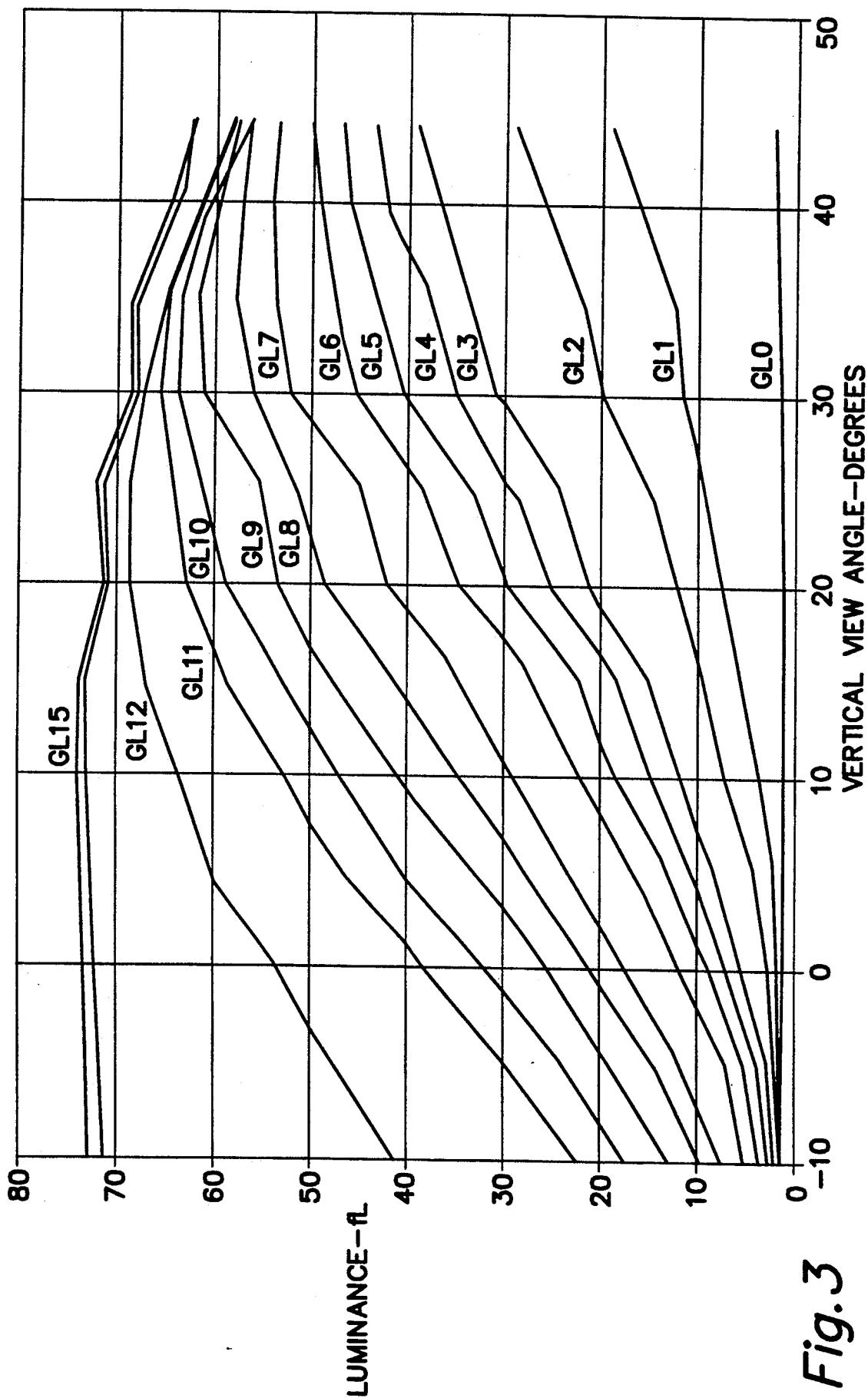
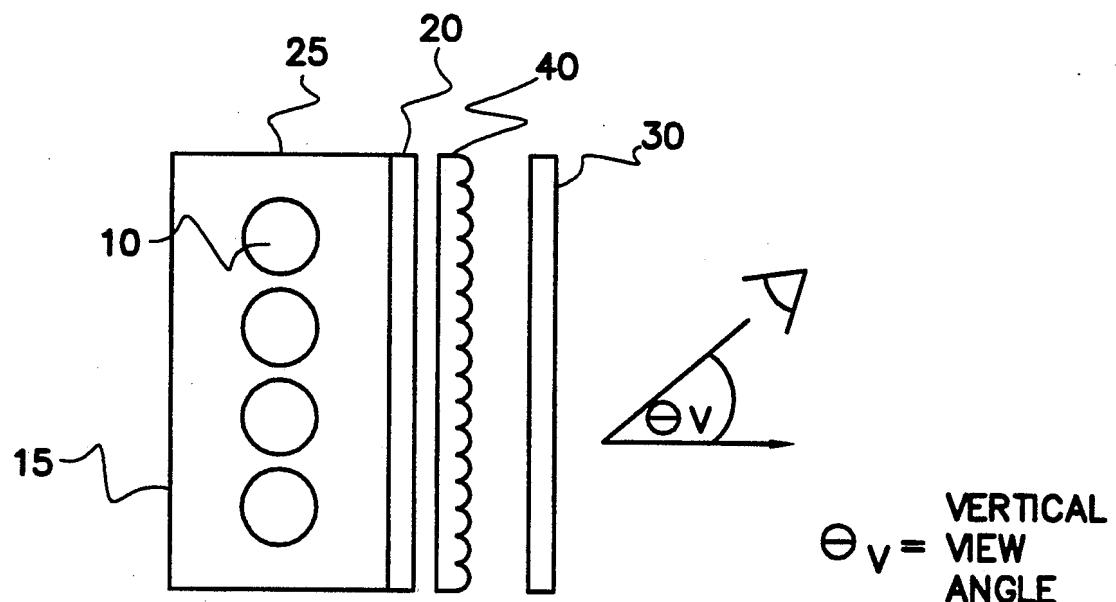
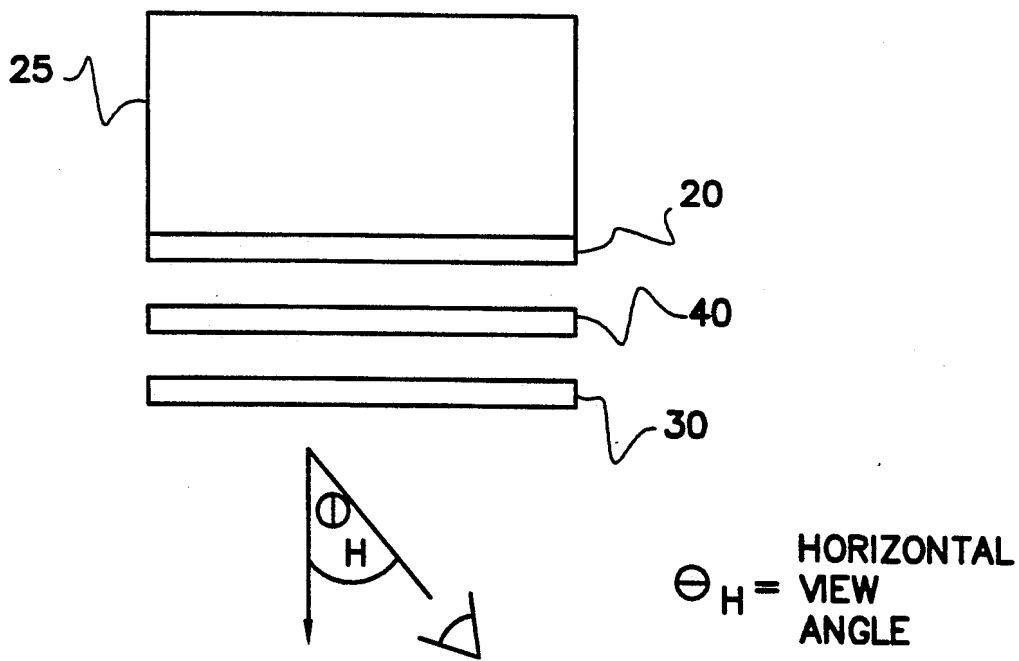


Fig. 3



*Fig. 4A*



*Fig. 4B*

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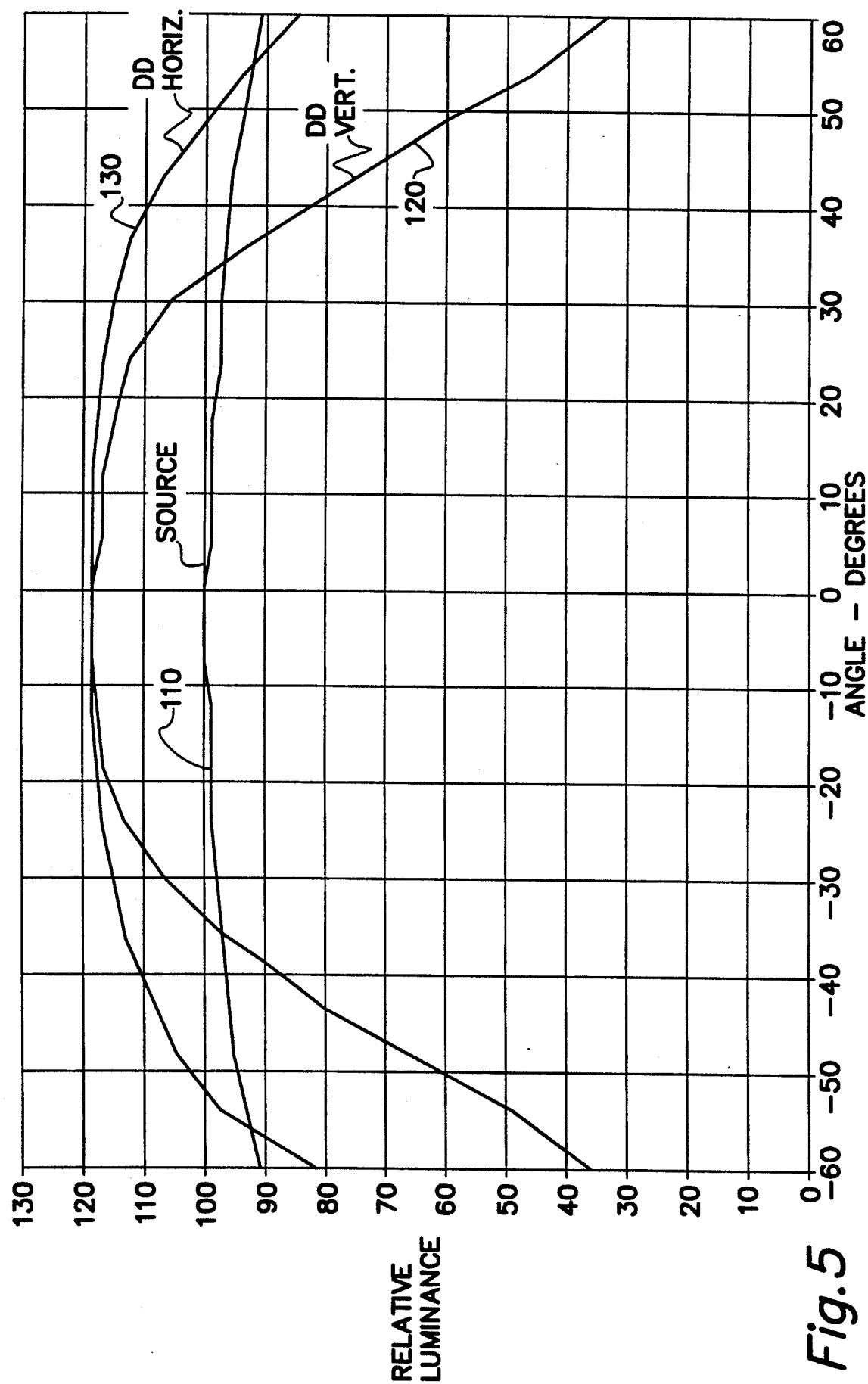
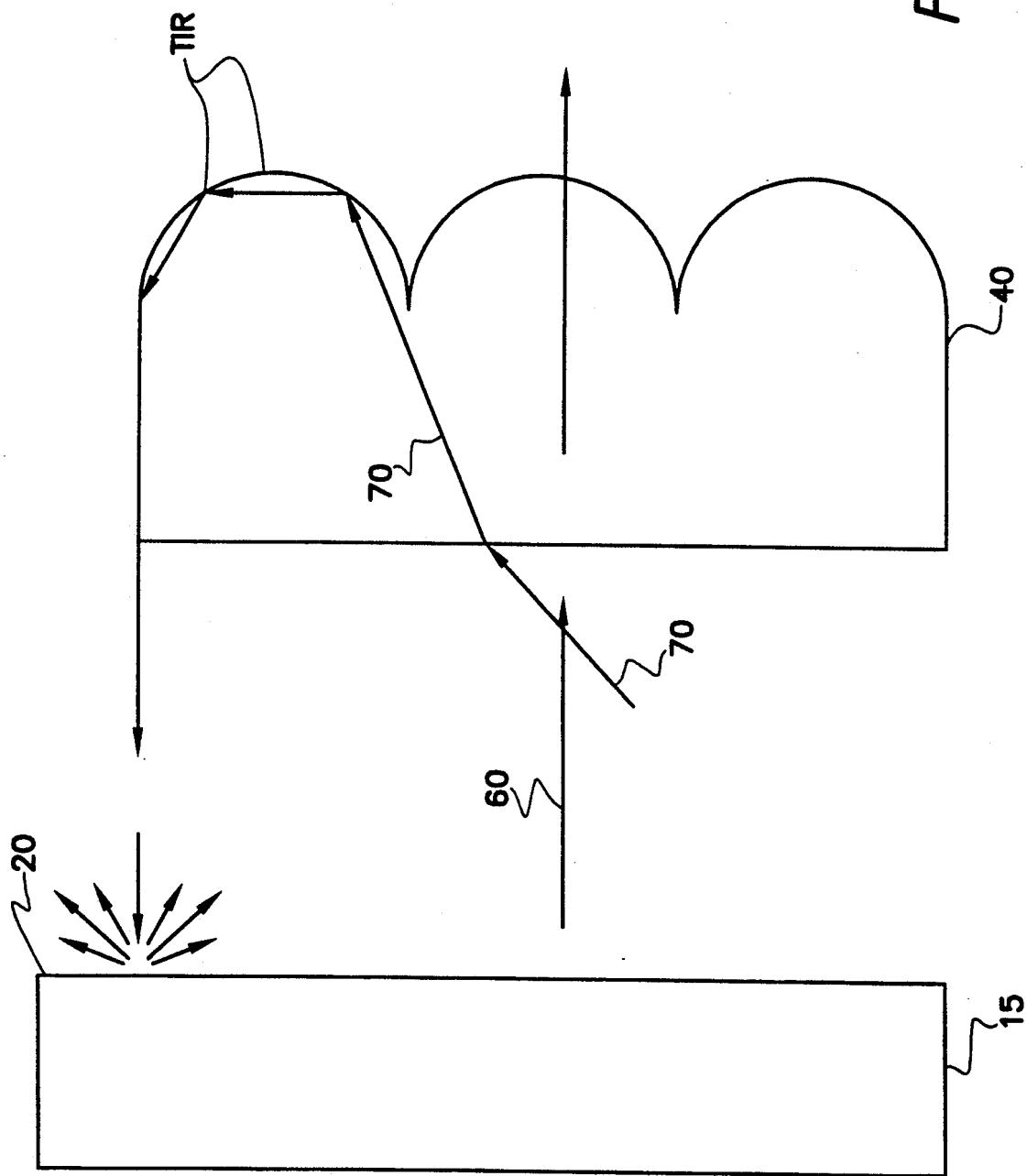


Fig. 5

Fig. 6



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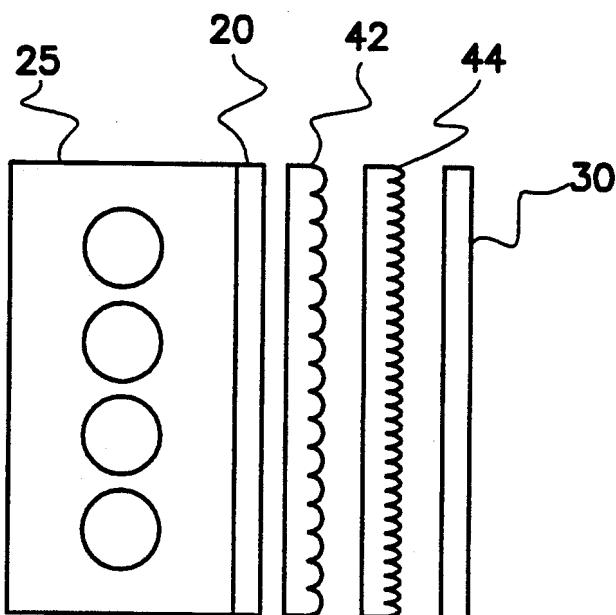


Fig. 7

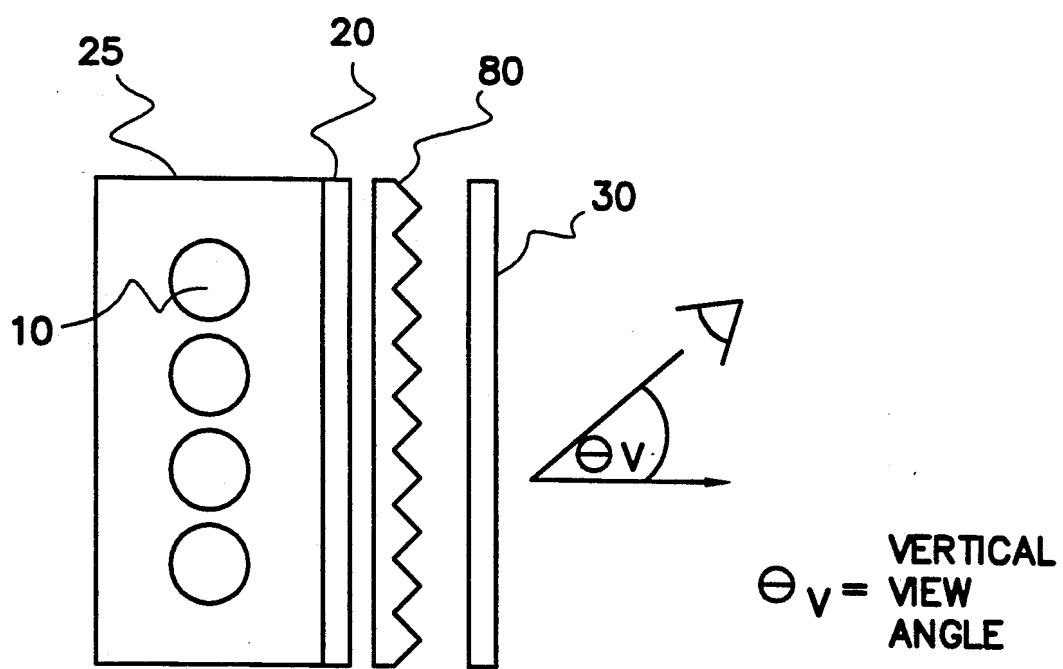


Fig. 10

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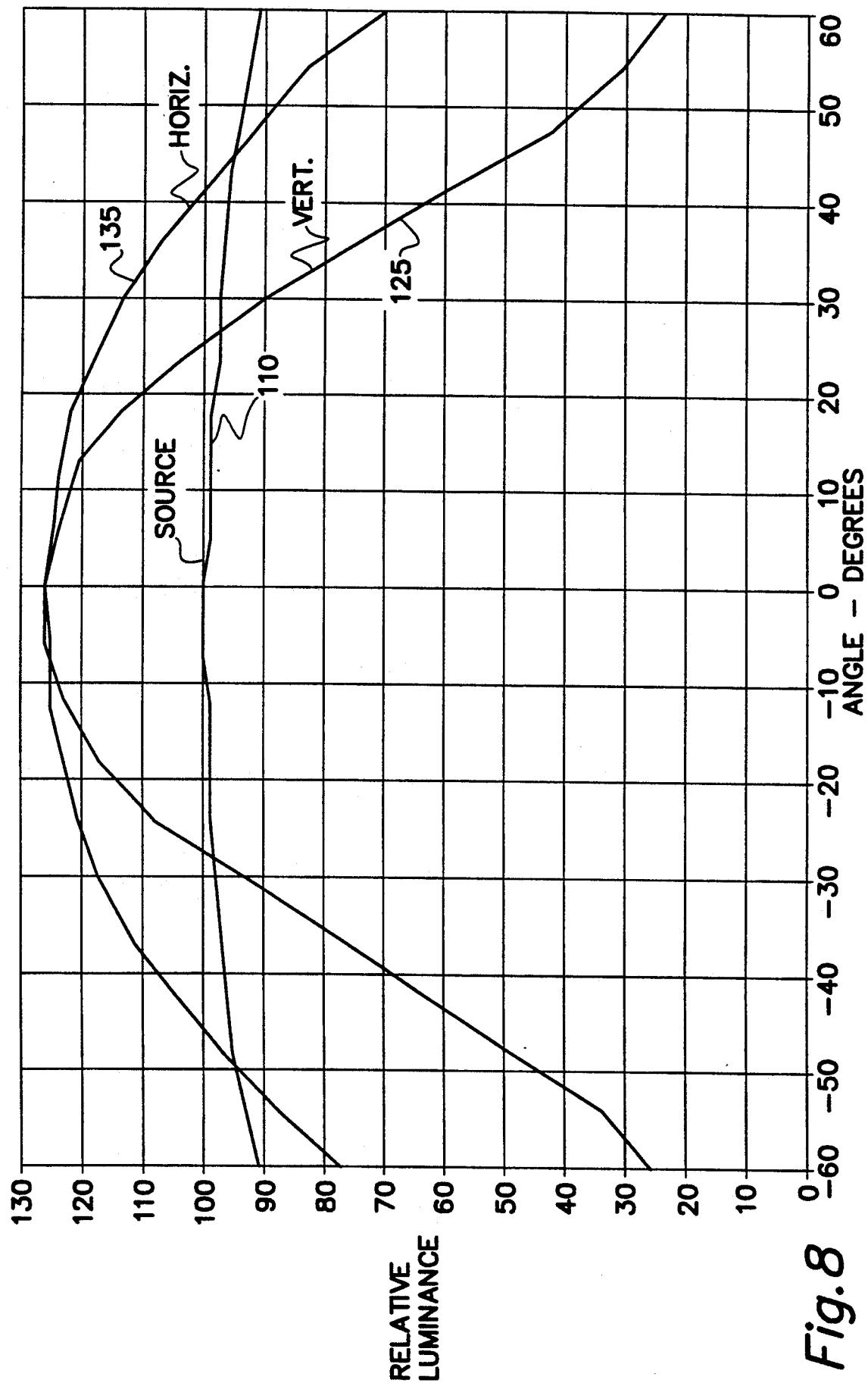


Fig. 8

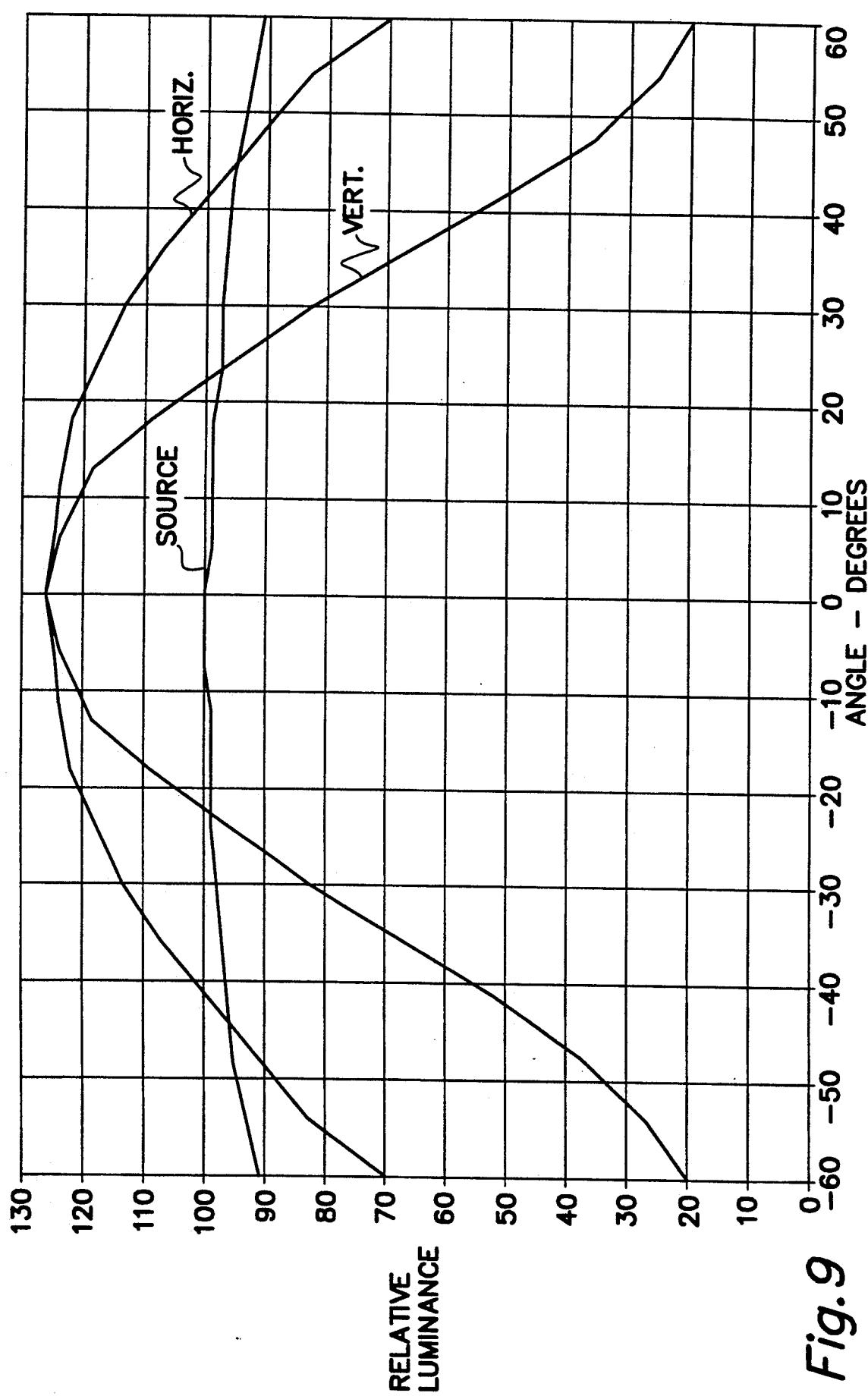


Fig. 9

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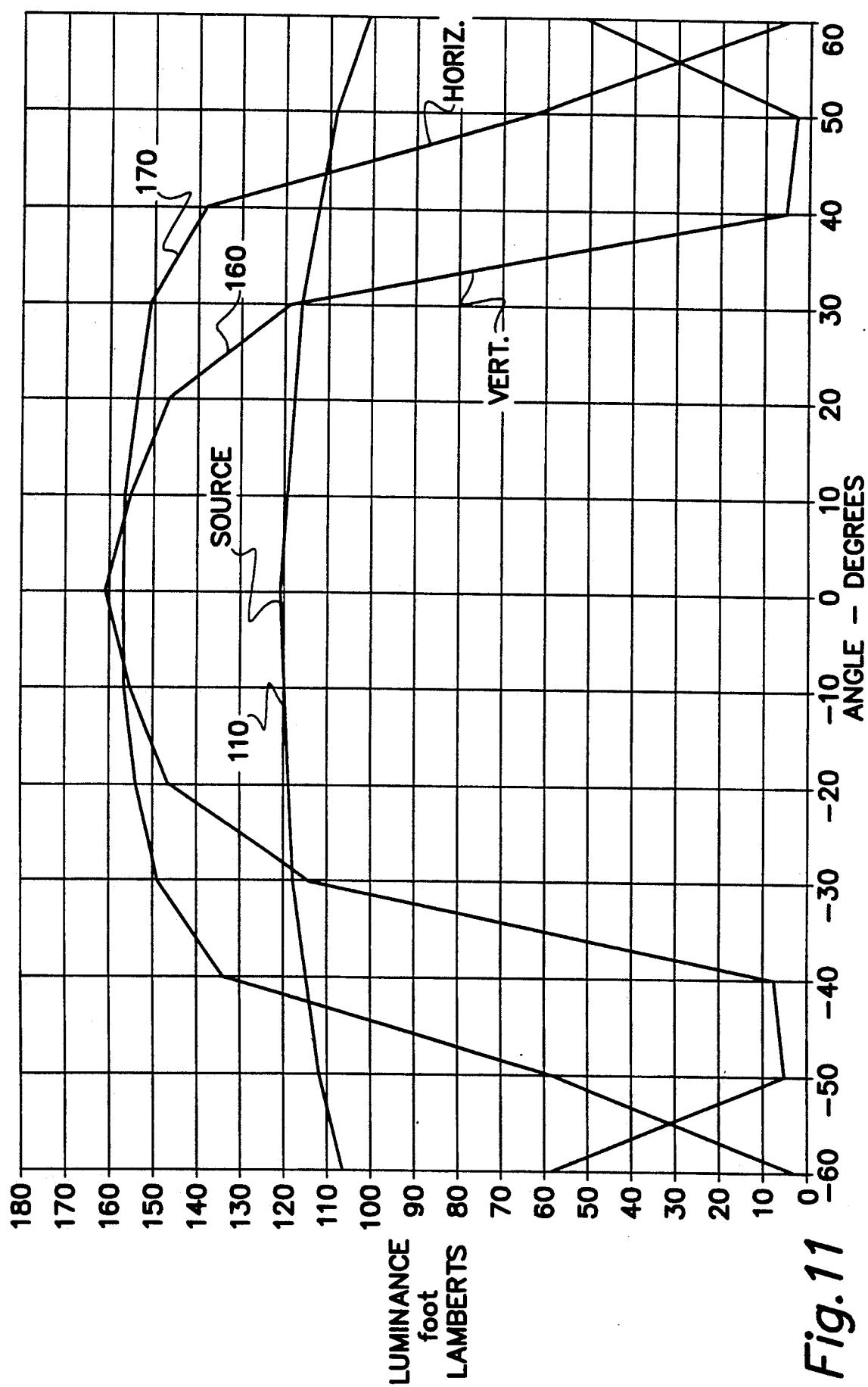


Fig. 11

U.S. Patent

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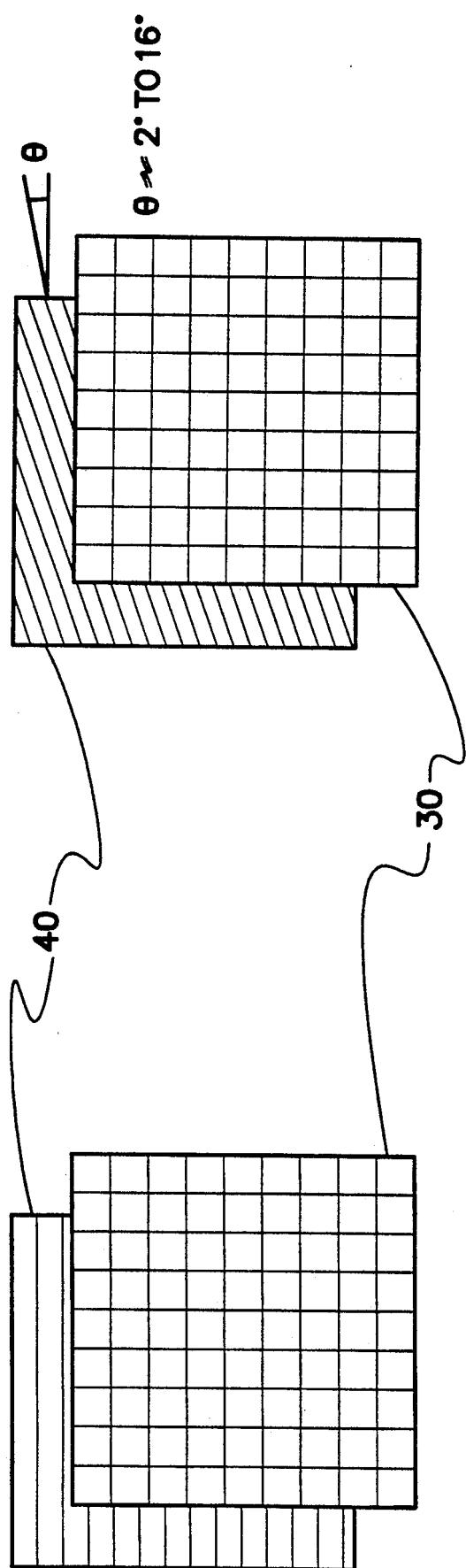


Fig. 12

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**DIRECTIONAL DIFFUSER FOR A LIQUID CRYSTAL DISPLAY****BACKGROUND OF THE INVENTION**

This invention relates in general to flat panel liquid crystal displays and, more particularly, to a liquid crystal display (LCD) having a directional diffuser to provide a tailored variation of luminance with viewing angle.

There are commercially available liquid crystal displays for use in various applications, including for example aircraft cockpit displays. However, a typical characteristic of the liquid crystal panel used therein is a wide variation of the light transmission of the liquid crystal panel with viewing angle, especially the vertical viewing angle. This results in gray-scale errors and off-state errors with viewing angle. That is to say, the brightness of certain areas of the display when viewed at angles above or below a vertical viewing angle normal to the display surface, may be substantially different than the brightness of those areas when viewed at an angle normal to the display surface. This variation of brightness or luminance with viewing angle is generally undesirable and particularly undesirable in those cases where the information being displayed on the liquid crystal display is critical to an operation such as controlling or navigating an aircraft.

In addition, a typical diffuser used to provide a light source for backlighting a typical liquid crystal display ordinarily provides a constant luminance with viewing angle and therefore provides the same amount of energy for any given viewing angle of the display. In certain applications, such as for example an aircraft cockpit, the typical vertical viewing angle is fixed within a relatively narrow range and it would therefore be desirable to concentrate a higher percentage of the energy from the light source within a particular range of viewing angles.

It would therefore be desirable to provide a directional diffuser for use with a liquid crystal display to provide a tailored variation of luminance with viewing angle while also providing a concentration of the light energy from the light source within a predetermined range of viewing angles.

**SUMMARY OF THE INVENTION**

It is therefore an object of the present invention to provide a directional diffuser element for a liquid crystal display to provide a tailored variation of luminance with viewing angle.

It is a further object of the present invention to provide a liquid crystal display having less variation of intermediate gray-level luminance with viewing angle.

It is still further an object of the present invention to provide a liquid crystal display combining the above features to provide a higher concentration of light energy, and therefore increased luminance, within a particular range of viewing angles thereby providing a more efficient use of light energy available from a light source.

The foregoing and other objects are achieved in the present invention wherein there is provided a liquid crystal display apparatus comprising a light source, a liquid crystal planar array of pixels for creating an image by controlling the amount of light allowed to pass through each of the pixels, and one or more directional diffuser lens arrays disposed between the light

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source and the liquid crystal array for providing a tailored variation of luminance from the liquid crystal display as a function of vertical viewing angle.

**BRIEF DESCRIPTION OF THE DRAWINGS**

The above mentioned and other features and objects of the present invention and the manner of attaining them will become more apparent and the invention itself will be best understood by reference to the following description of alternative embodiments of the invention taken in conjunction with the accompanying drawings wherein:

FIG. 1 is an exploded view of a typical prior art backlit liquid crystal display;

FIG. 2 is an exploded view of the liquid crystal display of the present invention, having a directional diffuser lens array;

FIG. 3 illustrates a typical prior art LCD gray-level response showing the variation of luminance with vertical viewing angle;

FIGS. 4A and 4B show cross sectional side and top views of a typical assembly including the lens array of the present invention;

FIG. 5 illustrates the variation of luminance with viewing angle- for a light source alone and a light source combined with a single lens array;

FIG. 6 illustrates the path of various light rays when striking the lens array at various angles;

FIG. 7 is a cross sectional view of a preferred embodiment of the present invention with two lens arrays;

FIG. 8 illustrates the variation of luminance with viewing angle for the dual lens array configuration;

FIG. 9 illustrates the variation of luminance with viewing angle for a triple lens array configuration;

FIG. 10 is a cross sectional view of a configuration utilizing a triangular shaped lens array;

FIG. 11 illustrates the variation of luminance with viewing angle for the triangular shaped lens array; and

FIG. 12 shows the angular rotation of the lens array with respect to the LCD matrix array to eliminate residual moire effects.

**DESCRIPTION OF A PREFERRED EMBODIMENT**

Referring now to FIG. 1 there is shown a cross section of a typical prior art liquid crystal display apparatus including backlight array 25 comprising lamp 10, rear reflecting surface 15 and lambertian diffuser 20. The backlight array provides a source of light which impinges on liquid crystal panel 30 comprised of a number of individual liquid crystal elements which are alternately energized in order to form a desired pattern or image for viewing from the front of the liquid crystal display.

While this typical prior art liquid crystal panel may be adequate for certain applications where the normal viewing angle is more or less at an angle normal to the display surface, this display is not optimum for applications wherein the typical viewing angle is other than at an angle normal to the display surface. This prior art display exhibits a relatively wide variation of light transmission with viewing angle, especially the vertical viewing angle. As illustrated in FIG. 3 this variation also changes with the level of illumination for various gray-levels or intermediate intensities for a given display.

As can be seen in the curves of FIG. 3, the luminance emitted from the lower gray-levels of the LCD system increases significantly with increasing vertical viewing angle. This variation presents an undesirably large luminance increase with angle when the information being presented is low-level luminance information, such as for avionics applications including weather radar or attitude director indicator presentations. As a pilot viewing the display moves his vertical perspective, or his viewing angle, higher above a normal angle to the display (larger vertical viewing angles), he observes a low luminance field increase significantly in luminance, thereby causing confusion in interpretation of critical display information.

In addition, the lambertian diffuser of the typical prior art display, element 20 of FIG. 1, provides for a nearly equal luminance in all angular viewing directions. In most applications a 180° field of view in both horizontal and vertical directions is not required. It would therefore be more energy efficient if a substantial portion of the light energy could be redirected so as to be concentrated in the viewing angles of interest for a particular application.

The apparatus of the present invention includes the backlight array and liquid crystal of the prior art as shown in FIG. 1 with the addition of a lens array 40 inserted between the lambertian diffuser 20 of the prior art and liquid crystal display panel 30, as shown in FIG. 2. It was found that by inserting a directional diffuser consisting of a cylindrical lens array 40 between the lambertian diffuser and the liquid crystal panel that both of the desired effects could be accomplished. That is, the overall light energy is concentrated within a desired range of viewing angles and the variation of luminance with viewing angle is tailored to offset that which is obtained through the liquid crystal display alone.

For example, FIG. 5 illustrates that with the insertion of lens array 40 as shown in FIGS. 4A and 4B, the overall luminance has increased approximately 20 percent within a range from -20° to +20° viewing angle 40 and the desired decrease in luminance with increased vertical viewing angle is obtained between approximately +10° and +35° of vertical viewing angle. Curve 110 of FIG. 5 illustrates the variation of luminance with viewing angle for the lambertian light source only, in both the horizontal and vertical angles while curves 120 and 130 respectively represent a variation of luminance with vertical and horizontal viewing angles for the backlight including lens array 40.

The effect which results from the insertion of the cylindrical lens array is explained by reference to FIG. 6 wherein there are shown light rays from the lambertian (having uniform luminance with angle) source diffuser impinging on the lens array from various angles. An air gap must be present at the interface of the lambertian diffuser and the lens array. The normal 4 percent loss per surface due to fresnel reflections is not incurred, because the surface reflections are returned to the diffuser and reflected again.

Those rays that are normal to the source diffuser but less than the critical angle within the lens array are passed through the lens array materially unobstructed, except for a small amount of surface reflection. Rays which enter at oblique angles and are greater than the critical angle of the lens array undergo total internal reflection at the inside of the lens surface as illustrated by ray tracing 70. These rays are reflected with no loss due to the total internal reflection effect around the lens

periphery. They exit the rear of the lens array and return to the source diffuser where they undergo a secondary diffuse reflection from the source diffuser.

However, because the source diffuser is not totally reflective, some of the returned rays are transmitted through the diffuser and are then reflected from the backlight enclosure surface 15 of FIG. 4A. Some fraction of these rays are reflected internally to exit the diffuser again. These reflected rays again have a lambertian distribution at the surface of lambertian diffuser 20. It is apparent from this interaction between the lens array and the backlight that rays which impinge close to the normal tend to be intensified while those rays which impinge at oblique angles undergo total internal reflection and are returned to the diffuser and diminished somewhat from this statistical process.

However, the roll off or variation with vertical viewing angle for this single directional diffuser cylindrical lens array was not sufficient to offset the effects of the liquid crystal display, and there were significant moire patterns caused by the interference between the lens array and the display panel wherein the lens array contained 142 lenses per inch and the display panel matrix had a spatial frequency resolution of 172 dots or pixels per inch.

For the desired specific implementation it was discovered that the adverse interaction producing moire patterns could be eliminated by including a second lens array with a different number of lenses per inch. The combination of the dual lenses increased the desired reduction in luminance with increased viewing angle, and in addition reduced or eliminated the moire patterns with the selection of an appropriate pitch, or number of lenses per inch, for the two lenses in question.

As illustrated in FIG. 7, one of the lens arrays 42 was selected to have a relatively coarse pitch with respect to that of the liquid crystal display and the second lens array 44 was selected to have a relatively fine pitch with respect to that of liquid crystal display. FIG. 8 illustrates again the relatively flat response of the lambertian source diffuser alone curve 110, and the increased roll off with vertical viewing angle of curve 125 as well as the corresponding variation of luminance with horizontal viewing angle as illustrated by curve 135 for the dual lens array of FIG. 8.

In general it was discovered that the addition of additional lens arrays caused a steeper or more rapid variation of the change in luminance with vertical viewing angle, which was desirable, but the corresponding change in luminance with variations in horizontal viewing angle also became steeper, which was not desirable for the particular application in question. For the particular application in question the preferred embodiment included two lens arrays in series which provided the best tradeoff of decrease in luminance with variation of vertical viewing angle, while not adversely affecting the variation in luminance with horizontal viewing angle.

In addition, since moire effects result when both of the lens arrays have the same spatial frequency, the rear array 42 should have a coarse resolution or low spatial frequency while the front lens array 44 should have a fine resolution or high spatial frequency. The lens arrays and the panel spatial frequencies should be selected to avoid integral multiples of the other. Thus the fine lens array should be as high a spatial frequency as is practical and should be a non integral multiple of the panel frequency. According to these guidelines the fine

array frequency becomes approximately 2.5 times the display spatial frequency and the coarse array frequency should be approximately the fine array frequency divided by 3.5, 4.5, 5.5 or as required for the most convenient fabrication.

It was also discovered that the maximum increase in luminance was obtained using a triangular lens array having an included angle of 90° as illustrated in FIG. 10. This configuration resulted in a variation of luminance with vertical and horizontal viewing angles which was quite steep as illustrated by curves 160 and 170 of FIG. 11. Other lens array shapes may be selected as desired to obtain the required concentration of luminance and variation of luminance with vertical and horizontal viewing angle for a particular application.

Even though the spatial frequencies of the directional diffuser lens array and LCD panel have been selected to be greatly different and non-integer multiples, some visual banding effects or moire pattern effects may still be apparent to the viewer. This is especially true at off-axis viewing conditions. This residual moire can be removed by rotating the lens array 40 with the respect to the LCD array 30, as illustrated in FIG. 12. This rotation of the lens array by a few degrees (Typically 2 to 16 degrees) from the horizontal axis causes a small change in the effective spatial frequency difference of the two arrays and thereby eliminates the residual moire.

In addition to the angular redistribution of the light from the directional diffuser, the lens array also provides an additional diffusing effect, especially for any step variations in luminance that are parallel to (or nearly parallel to within a few degrees) the axis of the lens array. This allows the reduction of the thickness or optical density of the conventional diffuser while still achieving the same system luminance uniformity and masking of undesired spatial artifacts from the light source, but with higher luminance at the output.

While there have been described above the principals of invention in conjunction with several specific embodiments, it is to be clearly understood that these descriptions are made only by way of example and not as a limitation to the scope of the invention.

We claim:

1. A display apparatus comprising:  
a light source;  
a liquid crystal panel mounted adjacent to said light source for receiving light from said light source;  
and  
first and second lens arrays, each having a plurality of individual lenslets, disposed between said light source and said liquid crystal panel for providing a predetermined variation with viewing angle of light transmission from said light source through said lens arrays and said liquid crystal panel, wherein said liquid crystal panel comprises a plurality of pixels arranged in rows and columns, and wherein the number of rows of pixels per unit height, or pitch, of the liquid crystal panel is a first value; the number of lenslets per unit height, or pitch, of said first lens array is a second value which is less than said first value; and the number of lenslets per unit height, or pitch, of said second lens array is a third value which is greater than said first value.

2. A display apparatus in accordance with claim 1 wherein said third value is a non-integral multiple of said first value and is also a non-integral multiple of said second value.

3. A display apparatus comprising:  
a light source;

a liquid crystal panel mounted adjacent to said light source for receiving light from said light source;  
and  
first and second lens arrays, each having a plurality of individual lenslets, disposed between said light source and said liquid crystal panel for providing a predetermined variation with viewing angle of light transmission from said light source through said lens arrays and said liquid crystal panel, wherein at least one of said first and second lens arrays is rotated about an axis perpendicular to said liquid crystal panel in order to provide a slight misalignment between said lenslets and said liquid crystal panel.

\* \* \* \* \*

## EXHIBIT B

**EXHIBIT B**

**CUSTOMER DEFENDANTS**  
(\* Denotes Hybrid)

Apple Computer, Inc.

Argus a/k/a Hartford Computer Group, Inc.

Audiovox Communications Corp.  
Audiovox Corporation  
Audiovox Electronics Corporation

Casio Computer Co., Ltd.\*  
Casio, Inc.\*

Concord Cameras

Dell Inc.

Eastman Kodak Company

FujiFilm Corporation / Fuji Photo Film Co., Ltd.\*  
FujiFilm U.S.A., Inc. / Fuji Photo Film U.S.A., Inc.\*

Fujitsu Limited  
Fujitsu America, Inc.  
Fujitsu Computer Products of America, Inc.

Kyocera Wireless Corp.

Matsushita Electrical Industrial Co.\*  
Matsushita Electrical Corporation of America\*

Navman NZ Limited  
Navman U.S.A. Inc.

Nikon Corporation  
Nikon, Inc.

Nokia America  
Nokia Corporation  
Nokia Inc.

Olympus Corporation

Olympus America, Inc.

Pentax Corporation  
Pentax U.S.A., Inc.

Sanyo Electric Co., Ltd.  
Sanyo North America Corporation

Sony Corporation\*  
Sony Corporation of America\*

Sony Ericsson Mobile Communication AB  
Sony Ericsson Mobile Communications (USA) Inc.

Toshiba Corporation\*  
Toshiba America, Inc.\*

# EXHIBIT C

**EXHIBIT C****MANUFACTURER DEFENDANTS**  
**(Boldface Denotes Active Defendant)**

<u>Entity</u>	<u>Status</u>
All Around Co., Ltd.	No Appearance
Arima Display	Settled/Dismissed
AU Optronics Corp. AU Optronics Corporation America	Settled/Dismissed
BOE Hydis, Ltd. Beijing BOE Optoelectronics Technology Co., Ltd. BOE Technology Group Company Ltd. BOE-Hydis Technology Co., Ltd.	Stayed Due to Bankruptcy
Casio Computer Co., Ltd. Casio, Inc.	Settled/Dismissed
<b>Citizen Watch Co., Ltd.</b> <b>Citizen Displays Co., Ltd.</b> <b>Citizen Systems Europe</b> <b>Citizen Systems America Corporation</b>	Active
<b>FujiFilm Corporation / Fuji Photo Film Co., Ltd.</b> <b>FujiFilm U.S.A., Inc. / Fuji Photo Film U.S.A., Inc.</b>	Active
HannStar Display Corporation	Settled/Dismissed
Hitachi, Ltd. Hitachi Displays, Ltd. Hitachi Display Devices, Ltd. Hitachi Electronic Devices (USA), Inc.	Settled/Dismissed
InnoLux Display Corporation	Jurisdictional Dispute
International Display Technology International Display Technology USA, Inc.	Settled/Dismissed
Matsushita Electrical Industrial Co. Matsushita Electrical Corporation of America	Stayed

M-Display Optronics	Dismissed
<b>Optrex</b>	Active
Koninklijke Philips Electronics N.V. Philips Consumer Electronics North America Philips Electronics North America Corporation	Settled/Dismissed
Picvue Electronics Limited	No Appearance
Quanta Display, Inc.	Settled/Dismissed
<b>Samsung SDI Co., Ltd.</b> <b>Samsung SDI America, Inc.</b>	Active
Sanyo Electric Co., Ltd. Sanyo North America Corporation	Settled/Dismissed
Sanyo Epson Imaging Devices Corporation Sanyo Epson Imaging Devices (Hong Kong) Ltd. Sanyo Epson Imaging Devices (Philippines) Inc. Seiko Epson Corporation	Settled/Dismissed
Sony Corporation Sony Corporation of America St. Liquid Display Corp.	Settled/Dismissed
Toppoly Optoelectronics Corp.	Settled/Dismissed
Toshiba Corporation Toshiba America, Inc.	Settled/Dismissed
Wintek Corp. Wintek Electro-Optics Corporation	Settled/Dismissed
Wistron Corporation	Dismissed

# EXHIBIT D

## EXHIBIT D

**Honeywell v. Apple, et al.**  
**Case No. 1:04-cv-1338**

## TIMELINE

October 2004	Original Complaint filed on October 4, 2004, followed by First Amended Complaint on October 8, 2004, against Customer Defendants.
February 2005	Second Amended Complaint filed.
May 2005	Judge Jordan provisionally orders the reconfiguration of the case, subject to identification of relevant suppliers.
June to November 2005	Customer Defendants informally identify certain suppliers of LCD modules.
October 2005	Judge Jordan formally stays case against Customer Defendants and formally orders that case be reconfigured against Manufacturer Defendants.
November 2005	Third Amended Complaint filed against Manufacturer Defendants.
December 2006	Judge Jordan vacates judicial position. Case referred to Magistrate Judge Mary Pat Thynge for all pretrial proceedings.
Summer 2006 - January 2008	Factual discovery between Honeywell and Manufacturer Defendants.
February 2008	Case reassigned to Judge Farnan.
July 2008	Scheduled Markman Hearing before Judge Farnan.

# EXHIBIT E

**EXHIBIT E****LICENSE AGREEMENTS RELATING TO THE '371 PATENT**

<b><u>AGREEMENT</u></b>	<b><u>DATE</u></b>
LG Philips LCD CO. Ltd.	3/28/03
Samsung Electronics Co., LTD.	6/18/04
NEC LCD Technologies, Ltd.	12/10/04
Chi Mei Optoelectronics, Inc. ("CMO")	12/22/04
Sharp Corporation (and 4/26/04)	3/25/05
Sanyo Electric Co., Ltd. & Sanyo Epson Imaging Devices	6/27/05
Chunghwa Picture Tubes, Ltd.	8/11/05
Toshiba Corporation	9/26/05
AU Optronics Corporation	3/15/06
HannStar Display Corporation	3/30/06
International Display Technology	8/02/06
Quanta Display Inc.	8/22/06
Sony/ST LCD	09/26/06
Casio	12/13/06
Philips	12/21/06
Arima	01/19/07
Toppoly (TPO)	01/31/07
Sanyo Epson/Seiko Epson	04/03/07
Hitachi, Ltd.	07/27/07
Wintek	09/21/07

# Exhibit Q

**REDACTED  
DOCUMENT**